



John R. Dills  
Plant Manager  
Shearon Harris Nuclear Power Plant  
5413 Shearon Harris Road  
New Hill, NC 27562-9300

984.229.2000

10 CFR 50.73

June 29, 2020  
Serial: RA-20-0210

ATTN: Document Control Desk  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555-0001

Shearon Harris Nuclear Power Plant, Unit 1  
Docket No. 50-400/Renewed License No. NPF-63

Subject: Licensee Event Report 2020-001-01

Ladies and Gentlemen:

Duke Energy Progress, LLC, submits the enclosed Licensee Event Report (LER) 2020-001-01 in accordance with 10 CFR 50.73 for Shearon Harris Nuclear Power Plant, Unit 1 (HNP). This LER is a supplement to LER 2020-001-00 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML20142A454), submitted on May 21, 2020.

On March 23, 2020, an automatic reactor trip occurred following actuation of the Reactor Protection System. All safety systems functioned as expected. The trip occurred during restoration from a planned maintenance evolution impacting the auto-stop turbine trip function of the digital electro-hydraulic system utilized for turbine control. The turbine control system has since been fully restored and the unit restarted. This event had no impact on the health and safety of the public.

There are no regulatory commitments contained within this report.

Please refer any questions regarding this submittal to Chuck Yarley at (984) 229-2477.

Sincerely,

A handwritten signature in blue ink, appearing to read 'John R. Dills', written over a horizontal line.

John R. Dills

Enclosure: Licensee Event Report 2020-001-01

cc: J. Zeiler, NRC Senior Resident Inspector, HNP  
M. Mahoney, NRC Project Manager, HNP  
NRC Regional Administrator, Region II



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NRC Regional Administrator, Region II



# **LICENSEE EVENT REPORT (LER)**

(See Page 2 for required number of digits/characters for each block)

(See NUREG-1022, R.3 for instruction and guidance for completing this form

<http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1022/r3/>)

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Information Services Branch (T-6 A10M), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by e-mail to [Infocollcts.Resource@nrc.gov](mailto:Infocollcts.Resource@nrc.gov), and the OMB reviewer at: OMB Office of Information and Regulatory Affairs, (3150-0104), Attn: Desk Officer for the Nuclear Regulatory Commission, 725 17th Street NW, Washington, DC 20503; e-mail: [oir\\_submission@omb.eop.gov](mailto:oir_submission@omb.eop.gov). The NRC may not conduct or sponsor, and a person is not required to respond to, a collection of information unless the document requesting or requiring the collection displays a currently valid OMB control number.

<b>1. Facility Name</b> Shearon Harris Nuclear Power Plant, Unit 1	<b>2. Docket Number</b> 05000 0400	<b>3. Page</b> 1 OF 3
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<b>4. Title</b> Automatic Reactor Trip During Turbine Control System Digital Electro-Hydraulic System Maintenance
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<b>5. Event Date</b>			<b>6. LER Number</b>			<b>7. Report Date</b>			<b>8. Other Facilities Involved</b>	
Month	Day	Year	Year	Sequential Number	Rev No.	Month	Day	Year	Facility Name	Docket Number
3	23	2020	2020	- 001	- 01	6	29	2020	Facility Name	Docket Number
										05000

<b>9. Operating Mode</b>	<b>11. This Report is Submitted Pursuant to the Requirements of 10 CFR §: (Check all that apply)</b>			
<b>1</b>	<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(I)	<input type="checkbox"/> 50.73(a)(2)(II)(A)	<input type="checkbox"/> 50.73(a)(2)(VIII)(A)
	<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(II)	<input type="checkbox"/> 50.73(a)(2)(II)(B)	<input type="checkbox"/> 50.73(a)(2)(VIII)(B)
	<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.73(a)(2)(III)	<input type="checkbox"/> 50.73(a)(2)(IX)(A)
	<input type="checkbox"/> 20.2203(a)(2)(I)	<input type="checkbox"/> 50.36(c)(1)(I)(A)	<input checked="" type="checkbox"/> 50.73(a)(2)(IV)(A)	<input type="checkbox"/> 50.73(a)(2)(X)
<b>10. Power Level</b>	<input type="checkbox"/> 20.2203(a)(2)(II)	<input type="checkbox"/> 50.36(c)(1)(II)(A)	<input type="checkbox"/> 50.73(a)(2)(V)(A)	<input type="checkbox"/> 73.71(a)(4)
<b>100</b>	<input type="checkbox"/> 20.2203(a)(2)(III)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(V)(B)	<input type="checkbox"/> 73.71(a)(5)
	<input type="checkbox"/> 20.2203(a)(2)(IV)	<input type="checkbox"/> 50.46(a)(3)(II)	<input type="checkbox"/> 50.73(a)(2)(V)(C)	<input type="checkbox"/> 73.77(a)(1)
	<input type="checkbox"/> 20.2203(a)(2)(V)	<input type="checkbox"/> 50.73(a)(2)(I)(A)	<input type="checkbox"/> 50.73(a)(2)(V)(D)	<input type="checkbox"/> 73.77(a)(2)(I)
	<input type="checkbox"/> 20.2203(a)(2)(VI)	<input type="checkbox"/> 50.73(a)(2)(I)(B)	<input type="checkbox"/> 50.73(a)(2)(VII)	<input type="checkbox"/> 73.77(a)(2)(II)
		<input type="checkbox"/> 50.73(a)(2)(I)(C)	<input type="checkbox"/> Other (Specify in Abstract below or in NRC Form 366A)	

<b>12. Licensee Contact for this LER</b>	
<b>Licensee Contact</b> Chuck Yarley, Regulatory Affairs Engineer	<b>Telephone Number (Include Area Code)</b> (984) 229-2477

<b>13. Complete One Line for each Component Failure Described in this Report</b>									
Cause	System	Component	Manufacturer	Reportable to ICES	Cause	System	Component	Manufacturer	Reportable to ICES
D	JJ	DCC	S629	Y					

<b>14. Supplemental Report Expected</b>	<b>15. Expected Submission Date</b>	Month	Day	Year
<input type="checkbox"/> Yes (If yes, complete 15. Expected Submission Date) <input checked="" type="checkbox"/> No				

**Abstract** (Limit to 1400 spaces, i.e., approximately 14 single-spaced typewritten lines)

On March 23, 2020, at 10:12 Eastern Daylight Time, Shearon Harris Nuclear Power Plant, Unit 1 (HNP), experienced an automatic reactor trip following actuation of the Reactor Protection System (RPS). The trip occurred during restoration from a planned maintenance activity that impacted the auto-stop turbine (AST) trip function of the digital electro-hydraulic system utilized for turbine control. The activity activated pressure switches in the RPS, resulting in a reactor trip. All safety systems functioned as designed. The RPS actuation also resulted in isolation of the main feedwater system and actuation of the auxiliary feedwater system on steam generator low level, an expected condition following a reactor trip.

The trip signal was a result of the restoration activity causing a sufficient depressurization of the AST header to activate pressure switches that feed the RPS. The restoration activity contained an erroneous sequence that reflected the recommended sequence supplied by the manufacturer of the turbine control system (TCS). The TCS was restored to functional and the unit is back online. The restoration sequence will be revised. Due to the actuation of the RPS system and auxiliary feedwater, this event is reportable per 10 CFR 50.73(a)(2)(iv).

**LICENSEE EVENT REPORT (LER)  
CONTINUATION SHEET**

(See NUREG-1022, R.3 for instruction and guidance for completing this form  
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1. FACILITY NAME	2. DOCKET NUMBER	3. LER NUMBER		
		YEAR	SEQUENTIAL NUMBER	REV NO.
Shearon Harris Nuclear Power Plant, Unit 1	05000-400	2020	001	01

**NARRATIVE**

Note: Energy Industry Identification System (EIS) codes are identified in the text within brackets [].

**A. Background**

Prior to the event, Shearon Harris Nuclear Power Plant, Unit 1 (HNP), was operating in Mode 1 at approximately 100 percent power under steady state conditions. There were no structures, systems, or components that were inoperable at the time of this event that contributed to the event.

This event is reportable per 10 CFR 50.73(a)(2)(iv)(A) as "Any event or condition that results in valid actuation of any of the systems listed in paragraph (a)(2)(iv)(B) of [10 CFR 50.73]..." due to actuation of the reactor protection system [JC] and auxiliary feedwater system (AFW) [BA]. All actuated safety systems functioned as designed.

The digital electro-hydraulic (DEH) system [JJ] was upgraded in April 2018 during refueling outage 21 with a new turbine control system (TCS) [JJ]. The TCS consists of a turbine valve control system (TVCS) [JJ] and a turbine protection system (TPS) [JJ]. These two systems work to position the high-pressure and low-pressure turbine steam inlet valves [V] to regulate the flow of steam through the turbine. The TCS provides automatic control of steam flow through the turbine. In addition, the turbine is afforded protection via the auto-stop turbine (AST) trip, overspeed protection control (OPC), and the secondary overspeed protection System [JJ]. The AST and OPC systems utilize logic from TVCS and TPS to control hydraulic trip components named Quadvoters [BLK], which are hydraulic control blocks that house four pilot-operated solenoid operated valves (SOVs) [SOL] arranged into two parallel banks of two SOVs in series. As such, a turbine trip requires both SOVs in one bank to change position and dump header pressure.

Digital outputs from the TCS controllers [DCC] supply the necessary voltages to position the valves to the desired position. This allows hydraulic fluid pressure from the electro-hydraulic pumps [P] to be applied to build AST/OPC header pressure, or to dump it to the vented drain header. The turbine trip condition requires the TCS to send a signal to de-energize the AST SOVs to depressurize the AST header, whereas the OPC utilizes a digital output signal to energize the OPC SOVs to depressurize the OPC header.

**B. Event Description**

On March 23, 2020, a planned maintenance activity was underway at HNP to replace a solenoid valve associated with an AST Quadvoter. The valve had been replaced and restoration activities were underway. At 10:12 Eastern Daylight Time, HNP experienced an automatic reactor trip following actuation of the RPS. It was later identified that the maintenance activity activated pressure switches in the RPS, resulting in a reactor trip. All safety systems functioned as designed. The RPS actuation also resulted in isolation of the main feedwater system [SJ] and actuation of the AFW system on steam generator [SG] low level, an expected condition following a reactor trip.

**C. Causal Factors**

The trip signal was a result of the restoration activity causing a sufficient depressurization of the AST header to activate pressure switches [PDS] that feed the RPS. The procedure used for the restoration activity contained an erroneous sequence that reflected the recommended sequence supplied by the manufacturer of the TCS.

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Shearon Harris Nuclear Power Plant, Unit 1	05000-400	2020	001	01

**NARRATIVE****D. Corrective Actions**

The TCS has been restored and the reactor is back online. The restoration sequence contained within the Quadvoter replacement procedure will be revised to use a sequence that will not result in a significant AST header pressure change.

**E. Safety Analysis**

The reactor trip is considered a normal scram and was not accompanied by complications. Main Feedwater was available throughout the event and was quickly restored as the steam generator's feed source after the reactor trip. All Engineered Safety Features [B] and Reactor Protection Systems [J] functioned as designed. No loss of reactor coolant system (RCS) [AB] inventory or excessive RCS cooldown occurred. Pressurizer [PZR] safety valves [RV] did not actuate. Thus, this event is low risk significant per Probabilistic Risk Assessment analysis. This event had no impact on the health and safety of the public.

**F. Additional Information**

There have been no events similar to those documented in this LER in the past three years. There have been two other LERs and one LER supplement submitted in the past three years due to a loss of Quadvoter function. These include LER 2018-003-00, submitted August 30, 2018, LER 2019-001-00, submitted June 17, 2019, and LER 2019-001-01, submitted September 16, 2019. However, these LERs document a loss of safety function as a result of AST Quadvoter SOVs unable to cycle. All solenoids were able to operate as designed to trip the reactor during the reactor trip on March 23, 2020.